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miles. Another immense area occurs along the Yellowstone, extending from its mouth nearly up to the Big Horn River, or for several hundred miles, as well as for long distances up its lower tributaries. The valleys of the Rosebud, Tongue, and Powder rivers are, indeed, among the most noteworthy localities of these metamorphic phenomena, the hills being sometimes reddened as far as the eye can reach by the burning out of the lignite beds. This metamorphism is, in short, almost coextensive with the lignitic tertiary formation of the Upper Missouri, which occupies an area some five hundred miles in length by about three hundred and fifty in breadth, extending from near the 100th to about the 108th meridian, and from the vicinity of the 43d to far beyond the 49th parallel. Within this region, however, are occasional districts where this metamorphism occurs only in the higher, scattered buttes, the great areas of this disturbance and change being the borders of the principal water-courses, as the Missouri and its southern tributaries between the above-named points, including the Yellowstone and its eastern affluents.

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JUMPING SEEDS AND GALLS.

AT a late meeting of the Academy of Sciences of St. Louis, Mr. C. V. Riley exhibited certain seeds which possessed a hidden power of jumping and moving about on the table. He stated that he had recently received them from Mr. G. W. Barnes, of San Diego, Cal., and that they were generally known by the name of "Mexican jumping seeds." They are probably derived from a tricoccous euphorbiaceous plant. Each of the seeds measures about one third of an inch in length, and has two flat sides, meeting at an obtuse angle, and a third broader, convex side, with a medial carina. If cut open, each is found to contain a single fat, whitish worm, which has eaten all the contents of the seed and lined the shell with a delicate carpet of silk. The worm very closely resembles the common apple worm (*Carpocapsa pomonella*), and indeed is very closely related, the insect being known to science as *Carpocapsa saltitans*. It was first recorded by Westwood in the Proceedings of the Ashmolean Society of Oxford, in 1857 (iii. 137, 138), and repeatedly referred to under the name of *Carpocapsa Dehaisiana* in the Annales of the French Entomological Society for 1859.

The egg of the moth is doubtless laid on the young pod, which contains the three angular seeds, and the worm gnaws into the succulent seed, which, in after growth, closes up the minute hole of entrance, just as in the case of the common pea weevil (*Bruchus pisi*). Toward the month of February the larva eats a circular hole through the hard shell of its habitation, and then closes it again with a little plug of silk so admirably adjusted that the future moth, which will have no jaws to cut with, may escape from its prison. A slight cocoon is then spun within the seed, with a passage-way leading to the circular door; and the hitherto restless larva assumes the quiescent pupa state. Shortly afterwards the pupa works to the door, pushes it open, and the little moth escapes. When ripe, the shell is very light, and, as the worm occupies but about one sixth the inclosed space, the slightest motion will cause the seed to rock from one of the flat sides to the other. But the seed is often made to jerk and jump, and, though this has been denied by many authors, Mr. Riley had had abundant proof of the fact, and had seen the seed jerked several lines forward at a bound, and raised a line or more from the surface on which it rested. If the seed be cut, the worm will soon cover up the hole with a transparent membrane of silk; and if two of the opposite angles be cut, the movements of the worm can then be seen, if the seed be held against the light. It thus becomes evident that the jerking motion is conveyed by the worm holding fast to the silken lining by its anal and four hind abdominal prolegs, which have very strong hooks, and then drawing back the head and fore-body and tapping the wall of its cell with the head, sometimes thrown from side to side, but more often brought directly down, as in the motion of a woodpecker's head when tapping for insects. In drawing back the fore-body the thoracic part swells, and the horny thoracic legs are withdrawn, so as to assist the jaws in receiving the shock of the tap, which is very vigorous, and often given at the rate of two a second and for twenty or more times without interruption. It is remarkable that this, of all the numerous seed-inhabiting Lepidopterous larvæ, should possess so curious a habit. The seed will move for several months, because, as with most Tortricidous larvæ, this one remains a long time in the larva state after coming to its growth and before pupating.

Mr. Barnes gives the following account of the plant, received through Captain Polhamus, of Yuma, A. T. It seems to be called both *Yerba de flecha* and *Colliguaja* by the Mexicans: "Arrow-weed (*Yerba de flecha*). This is the name the shrub bears that produces the triangular seeds that during six or eight months have a continual jumping movement. The shrub is small, from four to six feet in height, branchy, and in the months of June and July yields the seeds, a pod containing from three to five seeds. These seeds have each a little worm inside. The leaf of the plant is very similar to that of the 'garambullo,' the only difference being in the size, this being a little larger. It is half an inch in length and a quarter of an inch in width, a little more or less. The bark of the shrub is ash-colored, and the leaf is perfectly green during all the seasons. By merely stirring coffee or any drink with a small branch of it, it acts as an active cathartic. Taken in large doses it is an active poison, speedily causing death unless counteracted by an antidote."

Mr. Riley stated that the seed of *Tamariscus* was known to be moved by a Coleopterous larva (*Nanodes tamarisci*) that fed within it; and he concluded by describing and exhibiting a still more wonderful jumping property in a seed-like body which may be observed in our own woods. It is a little spherical, seed-like gall produced in large numbers on the under side of the post and other oaks of the white-oak group. This gall drops in large quantities to the ground, and the insect within can make it bound twenty times its own length, the ground under an infested tree being sometimes fairly alive with the mysterious moving bodies. The noise made often resembles the pattering of rain. The motion is imparted by the insect in the pupa and not in the larva state. Mr. Riley presented a description of the gall, which may be known by the name of *Quercus saltatorius*, the black fly which issues from it having been described as *Cynips saltatorius* by Mr. H. Edwards, of San Francisco.

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THE PROGRESS OF DISCOVERY OF THE LAWS OF EVOLUTION.

AT a recent meeting of the Academy of Natural Sciences of Philadelphia, Professor Cope made some remarks on the progress of discovery of the laws of evolution, of which the following is a synopsis: —

He remarked that while Darwin has been its prominent advocate within the last few years, it was first presented to the scientific world in a rational form by Lamarck, of Paris, at the commencement of the present century. Owing to the adverse influence of Cuvier, the doctrine remained dormant for half a century, and Darwin resuscitated it, making important additions at